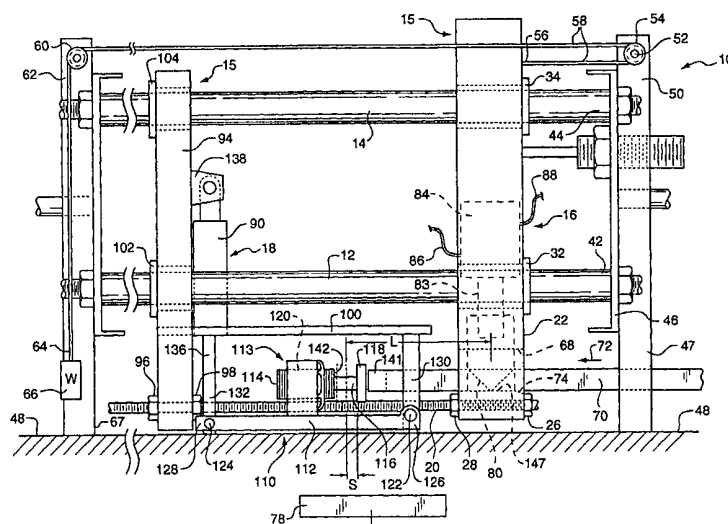




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁷ : B23D 25/04, B26D 1/60, 5/38</p>	<p>A1</p>	<p>(11) International Publication Number: WO 00/54917</p> <p>(43) International Publication Date: 21 September 2000 (21.09.00)</p>
<p>(21) International Application Number: PCT/US00/07327</p> <p>(22) International Filing Date: 20 March 2000 (20.03.00)</p> <p>(30) Priority Data: 09/272,222 18 March 1999 (18.03.99) US</p> <p>(71) Applicant: VILIMS, Dorothy, R. (executrix for the deceased inventor) [US/US]; 5618 Dunham Road, Downers Grove, IL 60516 (US).</p> <p>(72) Inventor: VILIMS, Daniel, E. (deceased).</p> <p>(74) Agent: VIGIL, Thomas, R.; Vigil & Associates, 836 South Northwest Highway, Barrington, IL 60010 (US).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. With amended claims.</p>	

(54) Title: FLYING CUT-OFF MECHANISM WITH ACCURATE LENGTH CONTROL



(57) Abstract

The flying cut-off mechanism (10) comprises: a carriage (15) including a cutting assembly (16) comprising a cutter (80) and a cutter operating mechanism (84) and a work piece stop and ejecting mechanism (18) both of which are slidably mounted on at least two slide rods (12, 14), and an adjustably positionable rod (20) connected between the cutting assembly and the stop and ejecting mechanism for holding them a predetermined distance apart. The cutting assembly has a lateral or transverse passageway (68) extending therethrough for receiving an elongate moving work piece (70). The stop and ejecting mechanism includes a shock absorbing device (113) for being engaged by an outer free end of the moving workpiece and compressed a predetermined distance. The carriage is moved by the work piece until the cutter operating mechanism is actuated for cutting a precise length of work piece situated between the cutter in the cutting assembly and the compressed position of the shock absorbing mechanism.

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5 **FLYING CUT-OFF MECHANISM WITH ACCURATE LENGTH CONTROL**
BACKGROUND OF THE INVENTION

1. Field of the Invention.

The present invention relates to a flying cut-off mechanism mountable on slide rods and having an accurate length control mechanism associated therewith. The
10 accurate length control mechanism includes a shock absorber against which a continuously moving elongate stock or work piece abuts before being cut by a die cutter which moves with the workpiece.

The shock absorber not only absorbs the initial force of impact from a moving work piece, but also provides a method of imparting a uniform and controlled
15 acceleration of a carriage assembly carrying the die cutter and the shock absorber. This uniform acceleration is ensured by the constant resistive force of gravity that is applied by a weight acting on the carriage through a series of pulleys.

2. Description of the Prior Art.

Heretofore a variety of flying cut-off machines have been proposed, and
20 examples of several previously proposed flying cut-off machines or mechanisms are disclosed in the following U.S. patents:

	<u>U.S. Patent No.</u>	<u>Patentee</u>
	4,228,706	Borzym
	4,727,783	John, Jr.
25	4,852,440	Bald
	5,125,250	Sun
	5,690,011	Hill, et al.

5

SUMMARY OF THE INVENTION

According to the present invention there is provided a flying cut-off mechanism including an accurate cut work piece length control system and comprising: a carriage including a cutting assembly comprising a cutter and a cutter operating mechanism and a work piece stop and work piece ejecting mechanism both of which are
10 constructed and arranged for being slidably mounted on at least two slide rods, and an adjustably positionable rod connected between the cutting assembly and the stop and ejecting mechanism for holding them a predetermined distance apart on the slide rods. The cutting assembly has a lateral or transverse passageway extending therethrough for receiving an elongate moving work piece. The stop and ejecting
15 mechanism includes a shock absorbing device constructed and arranged to be engaged by an outer free end of the moving workpiece and compressed a predetermined distance. The carriage is moved by the work piece until the cutter operating mechanism is actuated for cutting a precise length of work piece situated between the cutter in the cutting assembly and the compressed position of the shock
20 absorbing mechanism.

5

BRIEF DESCRIPTION OF THE DRAWINGS

The single Figure of the drawings is a partially schematic, block, front plan view of the flying cut-off mechanism constructed according to the teachings of the present invention.

5 **DESCRIPTION OF THE PREFERRED EMBODIMENT(S)**

As illustrated in the Figure, the flying cut-off mechanism with accurate length control for cut work pieces of the present invention is generally identified by the reference numeral 10 in the Figure.

This mechanism 10 includes at least two, fixed in place, slide rods, a lower, forward rod 12 and an upper, rear rod 14 on which the mechanism 10 is mounted for sliding movement, right-to-left and then left-to-right.

The flying cut-off mechanism 10 is schematically illustrated in the Figure and includes a carriage 15 comprising, as basic components thereof, (a) a cutting assembly 16 which is slidably mounted on the two slide rods 12 and 14, (b) a work piece stop and work piece ejecting mechanism, or simply, stop and ejecting mechanism 18, positioned to the right of the cutting assembly 18 and also mounted on the two slide rods 12 and 14, and (c) a threaded rod 20 which is fixed to the cutting assembly 16 and to the stop and ejecting mechanism 18 to hold them relative to each other thereby to form the carriage 15.

As shown, the cutting assembly 16 is typically a "Pneumatic Toggle Press" sold by BTM corporation of Marysville, Michigan and includes a block shaped housing 22 which is made of plates that are bolted together (the bolts not being shown here for convenience) and which has therein a bore extending laterally therethrough for receiving one end of the threaded rod 20. Then, the threaded rod 20 is secured to the housing 22 by threaded nuts 26 and 28.

Also mounted in the housing 22 are two journal bearings 32 and 34 which slidably receive therethrough, respectively, the slide rods 12 and 14. Again, it is to be understood that the cut-off mechanism 16 is movable on the slide rods 12 and 14. As shown, right hand ends 42 and 44 of the slide rods 12 and 14 are fixed in a C-in-cross-section beam 46 which is mounted on an upright frame member 47 supported on a stationary support or floor 48. At the top 50 of the frame member 47 is mounted a stub shaft 52 on which is mounted a pulley or idler roller 54.

As shown, one end 56 of a cable or rope 58 is fixed to a right hand side of the housing 22 and then extends around the pulley or idler roller 54 and to the left to an idler roller 60 mounted to the far left of the flying cut-off mechanism 10 and pivotably mounted on an upright frame member 62 mounted on the fixed support or floor 48.

An outer end 64 of the cable or rope 58 is connected to a weight 66 so that there is a constant weight pulling on the housing 22 to pull the housing 22 to the right.

5 Extending through the housing 22 is a through passage 68 through which an elongate rod-like stock or work piece 70 is continuously moving from right to left, as shown by the arrow 72.

If desired, an inclined surface 74 can be provided at the entrance to the passageway 68 so that in the event of gravity droop of the work piece 70, after it is
10 cut, it will engage the curved surface 74 and be aligned again to move horizontally to the left in line with the work piece stop and cut work ejecting mechanism 18. This usually does not happen, since the workpiece 70 is continuously moving to the left, even after it is cut. Also, at the same time, after the workpiece 70 is cut, the weight 66 pulls the carriage to the right until the workpiece 70 hits the stop and ejecting
15 mechanism 18.

Also, as shown in the Figure, an upper side 76 of the passageway 68 is significantly above the workpiece 70 to allow for movement of the cut end of a cut work piece 78 upwardly after the cut work piece 78 is ejected from the mechanism 10 by the stop and ejecting mechanism 18.

20 It will be understood that mounted within the cutting assembly 16 is a cutting blade 80, shown schematically, which is slidably received in a vertical slot and driven by a piston rod 83 extending from a cylinder 84.

As shown, a source of pressurized fluid, pneumatic or hydraulic, is supplied to an upper end of the cylinder 84 via a conduit 86 and then spent pneumatic or
25 hydraulic fluid exits the cylinder 84 via a conduit 88.

As will be described in greater detail hereinafter, the operation of the cylinder 84 is synchronized with the operation of a workpiece ejecting cylinder 90 in the stop and ejecting mechanism 18.

Turning now to the work piece stop and cut work piece ejecting mechanism 18,
30 simply referred to as the stop and ejecting mechanism 18, it will be seen from the Figure that the threaded rod 20 is fixed to an upright elongate fixture 94 of the mechanism 18 by two threaded nuts 96 and 98. The fixture 92 provides a support for a horizontally extending plate 100, a lower bearing journal 102 and an upper bearing journal 104 receiving the slide rod 14. The bearing journal 102 is received on the
35 slide rod 12 for holding the mechanism 18 on the slide rods 12 and 14.

Below the plate 100 and the fixture 92 is a shuttle assembly 110 which includes a support framework 112 which mounts a shock absorber 113 typically of the type sold under the trademark "ENDINE" by Endine, Inc. or Orchard Park, New York, and

5 typically including a cylinder 114, a piston rod 116, a shock absorbing end plate or stop 118 at an outer end of the piston rod 116 and a spring 120 around the piston rod 116.

It will be understood that hydraulic fluid is provided in the cylinder 114 and the piston rod 116 extends from the cylinder 114 to the end plate or stop 118.

10 The shuttle assembly 110 including the support framework 112 has two pivot rods 122 and 124 extending therethrough at each end 126 and 128 of the support frame 112. The pivot rod 122 has journaled thereon, an upwardly extending plate or bar 130 which is fixed at its upper end to the plate 100 mounted on the fixture 92.

On the pivot rod 124 is pivotally mounted one end 132 of a piston rod 136
15 extending from the cylinder 90. The upper end of the cylinder 90 is fixed to a bracket 138 which in turn is fixed to the upwardly extending fixture 94.

If desired, a guide block (not shown) can be mounted in the support framework 112 for guiding a free end 141 of the workpiece 70 into engagement with the end plate or stop 118. Also, a stop surface 142 can be provided at an outer end of the
20 cylinder 114 for being engaged by a back side of the end plate or stop 118 to limit the stroke of movement S of the stop 118.

It will be understood, as known in the art, that the moving stock or work piece 70 typically comes off a roll, such as a roll of extruded aluminum stock, e.g., stock having a C-shaped cross-section that is used for making metal door steps or metal
25 framing members. The moving stock 70 comes off of a large roll (not shown) and typically extends through several pairs of upper and lower guiding, aligning and feeding rollers (not shown) which are positioned to the left of the flying cut-off mechanism 10 between the flying cut-off mechanism 10 and the roll of stock or workpiece 70.

30 OPERATION

In the operation of the flying cut-off mechanism 10, the stock 70 comes into the mechanism 10 at various speeds and can be at a speed of up to 125 feet per minute or more. The work piece 70 moves in the direction 72 through the passageway 68 and into engagement with the end plate or stop 118 where it starts to move the whole
35 assembly 10 and at the same time compresses the spring 120 and/or forces the piston rod 116 into the hydraulic cylinder 114. The shock absorber 114 not only absorbs the initial force of impact from the moving workpiece 70 but also provides a method of imparting a uniform and controlled acceleration of the carriage 15. This

5 uniform acceleration is ensured by the constant resistive force of gravity that is applied by the weight 66 acting through a series of pulleys 54 and 60. The stroke of movement of the shock absorber end plate or stop 118 is indicated by the letter S and is typically one inch. Accordingly, after the work piece hits the stop end 118 and moves the shock absorber one inch, it is assured that a precise length of work piece
10 70 is located between the blade 80 and the bottomed out end plate or stop 118. This length L can be between 5 inches and 50 inches, depending on the setting of the length of the threaded rod 20 between the cutting assembly 16 and the stop and ejecting mechanism 18.

It will be understood, that after the bottoming of the end plate or stop 118 with
15 the stop surface 142, the assembly 10, including the housing 22, the threaded rod 20 and the stop and ejecting mechanism 18, is moved to the left for a short distance and for a very short period of time. In this respect, once the stop 142 has been hit, the mechanism 10 knows that a precise length of work piece 70 extends between the front end of the end plate or stop 118 and a lower edge of the cutting blade 80. This
20 length is identified by the reference letter L, the length of the cut work piece 78, and can vary depending upon the dimension required, and typically varies between 5 and 50 inches. In the meantime, the weight 66 which initially pulled the mechanism 10 to the right is moved upwardly as the end 141 of the work piece 70 engages end plate or stop 118 and moves the carriage 15 to the left.

25 Once the shock absorber stop 118 has been depressed to its limit, namely one inch, the cylinder 84 is activated to cause the cutting blade 80 to move downwardly and cut the work piece 70 with the cutting blade 80 moving downwardly against an anvil surface 147 forming a bottom side of the passage 68. At the same time, or a very short time thereafter, the cylinder 90 is activated to move the piston rod 136
30 upwardly to move the end of the shuttle assembly 110 downwardly. When this happens, the piston rod 136 is caused to move upwardly by the cylinder 90 to cause the cut section 78 of work piece 70 to come free from the flying cut-off mechanism 10 and fall down into a chute (not shown) and laterally (out of the plane of the Figure) where cut work pieces 78 are collected.

35 Again, it is to be noted that the length L of the work piece can be adjusted by turning the threaded nuts 96 and 98 to move them on the threaded rod 20 until a desired length L is established.

Further, it will be understood that the mechanism 10 operates continuously

5 causing the carriage 15 to go back and forth. First, it goes to the right under the pull of the weight 66 and then when the end 141 of the work piece 70 hits the end plate or stop 118 of the shock absorber 113, the carriage 15 moves to the left until the shock absorber 113 is compressed the stroke distance S, typically one inch, at which time the cylinder 84 is activated to cause the cutter blade 80 to cut the work piece 70
10 followed by activation of the cylinder 90 to move the piston rod 136 upwardly causing the end 126 to rotate clockwise about the rod 122 to cause ejection of a cut work piece 78 away from the flying cut-off mechanism 10.

Then, while the work piece 70 is still moving to the left, the weight 66 pulls the flying cut-off mechanism 10 to the right until the outer end 141 of the work piece 70
15 again engages the stop 118 of the shock absorber 113. This continues until the machine (not shown) feeding the work piece 70 to the left is shut down or all of the coiled work piece 70 has come off the large roll.

From the foregoing description, it will be appreciated that the flying cut-off mechanism 10 with accurate work piece length control of the present invention
20 described above has a number of advantages, some of which have been described above and others of which are inherent in the invention. Also, it will be apparent that modifications can be made to the flying cut-off mechanism 10 of the present invention without departing from the teachings of the invention. Accordingly, the scope of the invention is only to be limited as necessitated by the accompanying claims.

5

CLAIMS**I Claim:**

1. A flying cut-off mechanism including an accurate cut work piece length control system comprising:

a carriage;

10 said carriage including a cutting assembly comprising a cutter and cutter operating means and a work piece stop and work piece ejecting mechanism both of which are constructed and arranged for being mounting on at least two slide rods, and an adjustably positionable rod connected between said cutting assembly and said stop and ejecting mechanism for holding them a predetermined distance apart on the
15 slide rods;

said cutting assembly having a lateral or transverse passageway extending therethrough for receiving an elongate moving work piece; and

said stop and ejecting mechanism which includes shock absorbing means constructed and arranged to be engaged by an outer free end of the moving
20 workpiece and compressed a predetermined distance, and which is moved by the work piece until said cutter operating means is actuated for cutting a precise length of work piece situated between said cutter in said cutting assembly and the compressed position of said shock absorbing means.

2. The flying cut-off mechanism of claim 1 wherein said cutting assembly
25 includes:

a cutting blade of said cutter which is positioned on one side of said laterally or transversely extending passageway through said cutting assembly;

an anvil positioned opposite said cutter and defining a wall of said passageway; and

30 said operating means causing reciprocal movement of said cutting blade.

3. The flying cut-off mechanism of claim 1 wherein said stop and ejecting means includes:

a fixture which is journaled on the slide rods; and

a shuttle suspended from said fixture and mounting said shock absorbing
35 means.

4. The flying cut-off mechanism of claim 3 wherein said shuttle has a pivot connection to a link member extending from a component of said fixture at one end and being pivotably connected to a piston rod of a piston and cylinder assembly

5 mounted to said fixture, whereby operation of said piston and cylinder assembly will cause movement of one end of said shuttle thereby to move a work piece engaging end of said shock absorbing means about a pivot axis and through a short arc for causing ejection of a cut work piece from said flying cut-off mechanism.

5. The flying cut-off mechanism of claim 4 wherein said cutter of said cutting
10 assembly includes a cutting blade and said operating means is constructed and arranged to reciprocate said blade and wherein the operation of cutter operating means is coordinated with the operation of said piston and cylinder mechanism, so that said cutter is moved slightly before or simultaneously with operation of said piston and cylinder mechanism.

15 6. The flying cut-off mechanism of claim 4 wherein said shuttle member includes a guide block for guiding an outer end of the moving work piece into engagement with a work piece engaging end of said shock absorbing means.

7. The flying cut-off mechanism of claim 4 wherein said shuttle includes a stop
20 surface therein for engaging a rear side of a work piece engaging stop member of said shock absorbing means, thereby to limit the length of movement of said engaging stop member.

8. The flying cut-off mechanism of claim 7 wherein said length of movement is approximately one inch.

9. The flying cut-off mechanism of claim 1 including moving means for urging
25 said carriage toward said moving work piece.

10. The flying cut-off mechanism of claim 9 wherein said moving means comprises a rope or cable having one end coupled to one side of said carriage and an opposite end connected to a weight and said rope or cable being trained over idler rollers or pulleys to allow said weight to provide for continuous back and forth
30 movement of said carriage thereby allowing the incoming moving work piece to move said carriage in one direction and at the same time to allow said weight to move said carriage in the opposite direction, with said cutter being operated to cut said work piece whereupon said weight pulls said carriage back toward said moving work piece while said cut work piece is ejected .

35 11. The flying cut-off mechanism of claim 1 wherein the length of said cut work piece can be adjusted by adjusting the distance of said adjustable rod between said cutting assembly and said stop and ejecting mechanism, said cut work piece dimension between said cutting blade and said compressed shock absorbing means

5 being between 5 and 50 inches.

12. The flying cut-off mechanism of claim 1 wherein said adjustably positionable rod is a threaded rod.

AMENDED CLAIMS

[received by the International Bureau on 21 August 2000 (21.08.00);
original claims 1, 4 -7 and 11 amended; remaining claims unchanged (3 pages)]

1. (Amended) A flying cut-off mechanism including an accurate cut work
piece length control system comprising:
- 5 a carriage;
- said carriage including a cutting assembly comprising a cutter and cutter
operating means and a stop and ejecting mechanism for stopping movement of a
work piece and for ejecting a cut work piece, said stop and ejecting mechanism
being mounted on at least two slide rods, and an adjustably positionable rod is
- 10 connected between said cutting assembly and said stop and ejecting mechanism
for holding them a predetermined distance apart on said slide rods;
- said cutting assembly having a lateral or transverse passageway extending
therethrough for receiving an elongate moving work piece; and
- said stop and ejecting mechanism including shock absorbing means
- 15 constructed and arranged to be engaged by an outer free end of the moving
workpiece and to be compressed a predetermined distance, and being moved by
the work piece until said cutter operating means is actuated for cutting a precise
length of work piece situated between said cutter in said cutting assembly and the
compressed position of said shock absorbing means.
- 20 2. (Same) The flying cut-off mechanism of claim 1 wherein said cutting
assembly includes:
- a cutting blade of said cutter which is positioned on one side of said
laterally or transversely extending passageway through said cutting assembly;
- an anvil positioned opposite said cutter and defining a wall of said
- 25 passageway; and
- said operating means causing reciprocal movement of said cutting blade.
3. (Same) The flying cut-off mechanism of claim 1 wherein said stop and
ejecting means includes:
- a fixture which is journaled on the slide rods; and
- 30 a shuttle suspended from said fixture and mounting said shock absorbing
means.
4. (Amended) The flying cut-off mechanism of claim 3 wherein said shuttle
has a pivot connection to a link member extending from a component of said

fixture at one end and being pivotally connected to a piston rod of a piston and cylinder assembly mounted to said fixture at an opposite end, whereby operation of said piston and cylinder assembly will cause movement of said opposite end of said shuttle thereby to move said shock absorbing means about and around a
5 pivot axis and through a short arc for causing ejection of a cut work piece from said flying cut-off mechanism.

5. (Amended) The flying cut-off mechanism of claim 4 wherein said cutter of said cutting assembly includes a cutting blade and said operating means reciprocates said blade and wherein said cutter operating means moves said
10 cutting blade at substantially the same time said piston and cylinder mechanism is operated to pivot said shock absorbing means.

6. (Amended) The flying cut-off mechanism of claim 4 wherein said shuttle includes guide means for guiding an outer end of the moving work piece into engagement with a work piece engaging end of said shock absorbing means.

15 7. (Amended) The flying cut-off mechanism of claim 6 wherein said shock absorbing means includes a stop for engaging a rear side of said work piece engaging end of said shock absorbing means, thereby to limit the length of movement of said work piece engaging end.

8. (Same) The flying cut-off mechanism of claim 7 wherein said length of
20 movement is approximately one inch.

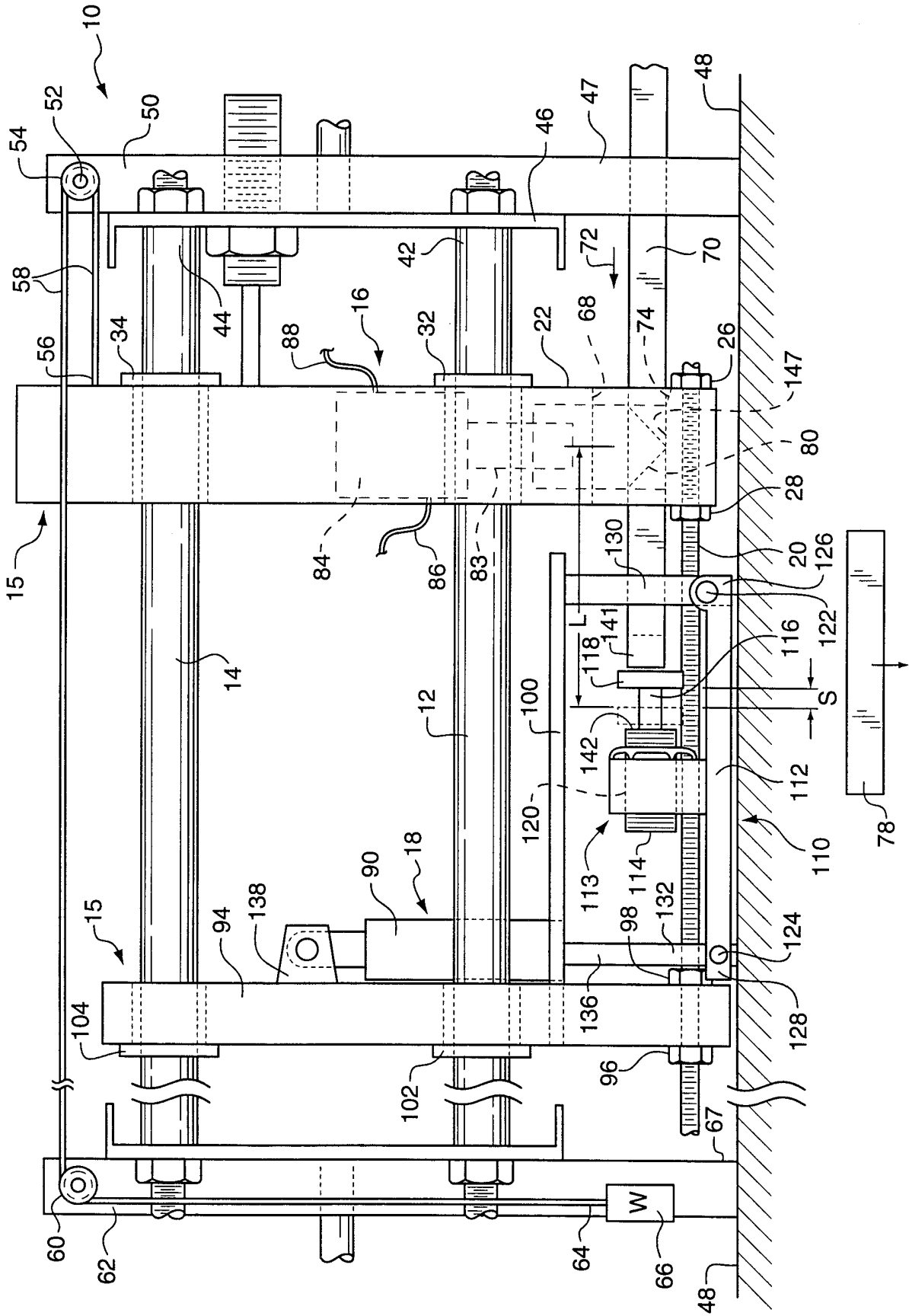
9. (Same) The flying cut-off mechanism of claim 1 including moving means for urging said carriage toward said moving work piece.

10. (Same) The flying cut-off mechanism of claim 9 wherein said moving means comprises a rope or cable having one end coupled to one side of said
25 carriage and an opposite end connected to a weight and said rope or cable being trained over idler rollers or pulleys to allow said weight to provide for continuous back and forth movement of said carriage thereby allowing the incoming moving work piece to move said carriage in one direction and at the same time to allow said weight to move said carriage in the opposite direction, with said carrier being
30 operated to cut said work piece whereupon said weight pulls said carriage back toward said moving work piece while said cut work piece is ejected.

11. (Amended) The flying cut-off mechanism of claim 1 wherein the length of said cut work piece can be adjusted by adjusting the distance of said adjustably

positionable rod between said cutting assembly and said stop and ejecting mechanism, said cut work piece dimension between said cutting blade and said compressed shock absorbing means being between 5 and 50 inches.

12. (Same) The flying cut-off mechanism of claim 1 wherein said adjustably
5 positionable rod is a threaded rod.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/07327

A. CLASSIFICATION OF SUBJECT MATTER		
IPC(7) :B23D 25/04; B26D 1/60, 5/38 US CL :83/157, 308, 310, 320, 395, 468.7, 639.1 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) U.S. : 83/147, 154, 157, 167, 290, 291, 308, 309, 310, 318-320, 374, 391, 394, 395, 438, 467.1, 468.5, 468.6, 468.7, 639.1, 949, 952		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched NONE		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) NONE		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3,410,164 A (<i>SCHLUTER</i>) 12 November 1968, See col. 3, lines 40-43.	1,2,11,12
Y	US 3,129,624 A (<i>AUER</i>) 21 April 1964, See Figs. 1 and 7.	1,2,11,12
A	US 2,682,307 A (<i>OVERMAN</i>) 29 June 1954, See col. 2, lines 24-36.	1,2,11,12
A	US 3,608,594 A (<i>HOLDERRIED</i>) 28 September 1971, See Figs. 2-5.	1,2,11,12
A	US 5,690,011 A (<i>HILL et al.</i>) 25 November 1997, See col. 4, lines 50-61.	1,2,11,12
<input type="checkbox"/> Further documents are listed in the continuation of Box C.		<input type="checkbox"/> See patent family annex.
* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
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"E" earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family	
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search 08 JUNE 2000	Date of mailing of the international search report 03 JUL 2000	
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer CLARK F. DEXTER Telephone No. (703) 308-1404	
	<i>Sheila Veney</i> Sheila Veney Paralegal Specialist Technology Center 3700	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/07327

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1, 2, 11, 12

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
 No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/07327

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claims 1, 2, 11 and 12, drawn to a flying cutoff mechanism with a specific cutting assembly.

Group II, claims 1, 3-8, 11 and 12, drawn to a flying cutoff mechanism with a specific stop and ejecting mechanism.

Group III, claims 1 and 9-12, drawn to a flying cutoff mechanism with a moving means.

The inventions listed as Groups I-III do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The inventions of groups II and III lack the special technical feature of the invention of group I; specifically, the special technical features of the cutting assembly (e.g., the anvil).

The inventions of groups I and III lack the special technical feature of the invention of group II; specifically, the special technical features of the stop and ejecting means (e.g., the shuttle).

The inventions of groups I and II lack the special technical feature of the invention of group III; specifically, the special technical feature of the moving means.